RESEARCH METHODOLOGY

Sem	Subject Code	Category	Lecture		Theory		Practical		Credit
			Per week	Per sem.	Per week	Per sem.	Per week	Per sem.	
III	21CPBC3C	Core	4	60	4	60	-	-	4

COURSE OBJECTIVE:

To impart knowledge and skills required for research, problem formulation, analysis and solutions and interpretation.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to -

CO Number	CO Statement	Knowledge Level ($K_1 – K_4$)
CO1	Understand some basic concepts of research and its methodologies.	**K1**
CO2	Identify appropriate research topics, select and define appropriate research problem and parameters.	**K2**
CO3	Provide knowledge on the key elements of a research report, write a research report or thesis using specific reference style.	**K3**
CO4	Describe the basic principles, the role biostatistics serves in biomedical research and assess data sources and data quality for the purpose of selecting appropriate data.	**K3**
CO5	Understand the ethics in animal experimentation	**K4**

(*CO – course Outcomes Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze).

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO5	PO6
CO1	M	S	S	M	M
CO2	M	M	S	S	M
CO3	S	S	M	M	S
CO4	S	S	M	S	M
CO5	M	S	M	S	S

(S- Strong; M-Medium; L-Low)

Total Hours: 60

UNIT I

Foundations of Research **10 Hours**

Introduction–research-meaning, objectives, motivation, Importance and need of research, types of research, criteria of good research, research process-meaning, stages in research work.

UNIT II

Research problem **10 Hours**

Research problem-defining a research problem, selecting and identifying the research problem, formulation of hypothesis- Types of research hypothesis, Research design- meaning need and features of a good research design, different research design-experimental design

UNIT III

Scientific writing characteristics **15 Hours**

Logical format for writing thesis and papers. Essential features of abstract, introduction, review of literature, materials and methods, and discussion. Effective illustration of tables and figures. Reference styles- Harvard and Vancouver systems

UNIT IV

Biostatistics **15 Hours**

Collection and classification of data, Framing a questionnaire, Diagrammatic and graphic representation of data measurement of central tendency - standard deviation, test of significance based on smaller samples - student ‘t’ test, correlation and regression - chi square test for independence of attributes, ANOVA and its types.

UNIT V

Bioethics and Patenting **10 Hours**

Declaration of Bologna, Ethics in animal experimentation, CPCSEA guidelines- Animal care and technical personnel environment, animal husbandry, feed, bedding, water, sanitation and

cleanliness, waste disposal, anesthesia and euthanasia. Patenting - Definition of patent. Patenting and fundamental research

DISTRIBUTION OF MARKS: Theory - 100% and Problems – Nil

TEACHING METHODOLOGY:

- Black Board
- Power Point Presentations
- Assignments
- Demonstrations

TEXT BOOKS:

S.NO	AUTHOR	TITLE	PUBLISHER	YEAR OF PUBLICATION
1.	C. R Kothari	Research methodology methods and techniques	New age international publishers	2019

REFERENCE BOOKS:

S.NO	AUTHOR	TITLE	PUBLISHER	YEAR OF PUBLICATION
1.	C. R Kothari	Research methodology methods and techniques	New age international publishers	2019
2.	N .Gurumani	An introduction to biostatistics	MJP publisher	2015
3.	Veer balarastogi	Biostatistics	Medtech	2015
4.	Dr. P. Ravilochanan	Research methodology	Margham publications	2012
5.	S. P .Gupta	Statistical methods	Sultan chand and sons	2012
6.	R.S.N.Pillai and Bagavathi	Statistics Theory and Practice	S.Chand	2010

WEB SOURCES:

1. https://en.wikipedia.org/wiki/Researchdesign
2. https://us.humankinetics.com/blogs/excerpt/steps-of-the-research-process
3. https://lecturenotes.in/m/21513-research-methodology

SYLLABUS DESIGNER:

- Dr.V. Prabha, Head& Assistant Professor of Bio-Chemistry
- Ms.T. Nalini, Assistant Professor of Bio-Chemistry

ADVANCED CLINICAL BIOCHEMISTRY

Sem	Sub. Code	Category	Lecture		Theory		Practical		Credit
			Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	
III	21CPBC3D	Elective	3	45	3	45	-	-	3

COURSE OBJECTIVE:

- To enable the fundamental biochemistry knowledge related to health, the clinical significance of the laboratory tests.
- To evaluate the abnormalities which commonly occur in the clinical field.
- To create awareness of different lifestyle diseases increasingly found in present day.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to -

CO Number	CO Statement	Knowledge Level ($K_1 – K_4$)
CO1	To discuss about the basic concepts of biochemical investigations and setting up clinical laboratory. To list the types of biological samples and their pre-analytical variables	**K1**
CO2	Describes about the basic principle of inborn error of metabolism.	**K2**
CO3	From this unit we can obtain the knowledge about the Endocrine and Organ function test.	**K2**
CO4	Explains about the importance of Diagnostic enzymes	**K3**
CO5	We can understand the basics of Prenatal diagnosis & Cancer Biology	**K4**

(*CO – Course Outcomes

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze).

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO5	PO6
CO1	S	M	S	M	M
CO2	M	M	S	S	M
CO3	S	S	M	M	S
CO4	S	S	S	S	M
CO5	M	M	M	S	S

(S - Strong; M-Medium; L – Low)

Total Hours: 45

UNIT I

Collection and preservation of Biological samples **8 Hours**

Collection and preservation of biological sample such as Blood, urine, saliva, bile and feaces. Quality assurance- control of Pre-analytical Variables, control of Analytical variables,control external and internal quality control measurements.Anemias, Hematuria, Hemoglobinipathies, Thalassemias,Coagulants, anticoagulants and preservatives .

UNIT-II

Disorder of Carbohydrate metabolism **10 Hours**

Diabetes mellitus - clinical features and metabolic complications, various types of Glucose tolerance test, glycosylated hemoglobin, Hypoglycemia and hyper glycemia, Ketone Bodies-ketonuria and ketonemia, Glycogen storage disease, galactosemia.

Disorder of Lipid Metabolism

Lipoprotein abnormalities and its diagnostic test, hypo and hypercholesterolemia, obesity, CHD and its clinical diagnosis, Taysach's disease and Niemann-picks disease.

Disorder of Protein and Nucleic acid metabolism.

Clinical features, biochemical cause and treatment of Alkaptonuria, phenylketonuria, homocystinuria, tyrosinuria, aminoaciduria, Hartnup disease, Hypo and hyperuricemia and Gout.

UNIT-III Endocrine and Organ function test **10 Hours**

Diagnosis of thyroid function, Assessment and clinical manifestation of Pancreatic function. Pancreatic function test –Direct test- secretin test and serum enzyme test, Indirect test – Fat absorption test and BT PABA test.

Gastric function test– examination of resting contents, fractional test meal, stimulation test, tubeless gastric analysis. Disorder of acid base balance.Renal function test – Physical examination, Blood examination, Glomerular function test, clearance test and tubular function test.

Liver function test- test based on – metabolic function, excretory function, synthetic function and detoxification function.

UNIT-IV Diagnostic enzymes **7 Hours**

Diagnostic enzymes– Plasma functional and non-functional enzymes, clinical significance of LDH, CPK, Aspartate transaminase, Alanine transaminase, Lipase, Amylase, Gamma glutamyltransferase,5' nucleotidaseand Alkaline phosphatase.

UNIT-V Prenatal diagnosis & Cancer Biology **10 Hours**

Prenatal detection of inborn error of hetro carriers by the enzyme assay in amniotic fluid, plasma cells and biopsy specimen. Free radicals in health and disease-Endogenous and exogenous free radicals, oxidative damage to lipid, protein and DNA.Role of enzymatic and non-enzymatic antioxidants.Cancer -morphological and metabolic changes in tumor cells. Tumor markers- AFP, CEA, HCG, Carcinogen.

DISTRIBUTION OF MARKS: Theory - 100% and Problems – Nil

TEACHING METHODOLOGY:

- Black Board
- Power Point Presentations
- Assignments
- Models
- Demonstrations

TEXT BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION

1.	M.N.Chaterjee	Text book of medical Biochemistry	Jaypee Brothers Medical Publishers (P) Ltd	8th edition 2012

REFERENCE BOOKS:

S. NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
4.	Hoffmann.W.S	Clinical Biochemistry	*Year Book Medical* Publishers	4thedition(1970)
5.	A.C.Deb	Fundamentals of Biochemistry	New Central *Book* Agency	7th edition(2006)
6.	K.Wilson and I.Walker	Practical Biochemistry	Cambridge University press	5thedition(2000)
7.	S.K.Sawhney	Introductory Practical Biochemistry	Alpha Science International, Ltd	2nd edition(2005)
8.	Tietz	Fundamentals of Clinical chemistry	C.A.Burtis, E.R.Ash wood(eds),SaundersWB Co	5th edition

WEB SOURCES:

- www.journals.elsevier.com.
- www.acb.org.uk.
- www.sciencedirect.com.
- www.medicalbiochemistrypage.org.
- www.springer.com
- www.degruyter.com.
- www.openclinicalbiochemistryjournal.com
- www.academic.oup.com.

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